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Mobile phone use may affect semen quality

A team from the UNIGE and Swiss TPH has published a large study covering more than a decade of data on the effects of mobile phones on semen quality of young men.

Does electromagnetic radiation emitted by mobile phones affect semen quality? While various environmental and lifestyle factors have been proposed to explain the decline in semen quality observed over the last fifty years, the role of mobile phones has yet to be demonstrated. A team from the University of Geneva (UNIGE), in collaboration with the Swiss Tropical and Public Health Institute (Swiss TPH), has published a major cross-sectional study on the subject. It shows that frequent use of mobile phones is associated with a lower sperm concentration and total sperm count. However, researchers did not find any association between mobile phone use and low sperm motility and morphology. Read the results in *Fertility & Sterility*.

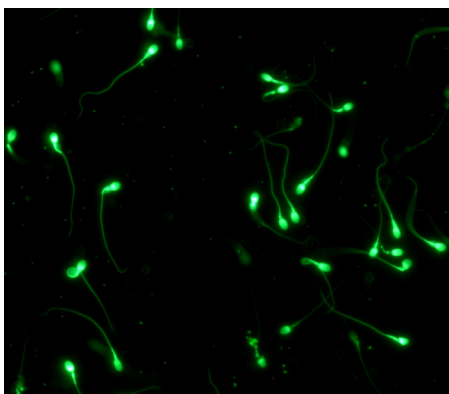
Semen quality is determined by the assessment of parameters such as sperm concentration, total sperm count, sperm motility and sperm morphology. According to the values established by the World Health Organization (WHO), a man will most probably take more than one year to conceive a child if his sperm concentration is below 15 million per milliliter. In addition, the percentage chance of pregnancy will decrease if the sperm concentration is below 40 million per milliliter.

Many studies have shown that semen quality has decreased over the last fifty years. Sperm count is reported to have dropped from an average of 99 million sperm per millilitre to 47 million per millilitre. This phenomenon is thought to be the result of a combination of environmental factors (endocrine disruptors, pesticides, radiation) and lifestyle habits (diet, alcohol, stress, smoking).

Assessing the impact of mobile phones

Is the mobile phone also to blame? After conducting the [first national study](#) (2019) on the semen quality of young men in Switzerland, a team from the University of Geneva (UNIGE) has published the largest cross-sectional study on this topic. It is based on data from 2886 Swiss men aged 18 to 22, recruited between 2005 and 2018 at six military conscription centres.

In collaboration with the Swiss Tropical and Public Health Institute (Swiss TPH), scientists studied the association between semen parameters of these 2886 men and their use of mobile phones. “Men completed a detailed questionnaire related to their lifestyle habits, their general health status and more specifically the frequency at which they used their phones, as well as where they placed it when



Sample of human spermatozoa.

High resolution pictures

not in use,” explains Serge Nef, full professor in the Department of Genetic Medicine and Development at the UNIGE Faculty of Medicine and at the SCAHT – Swiss Centre for Applied Human Toxicology, who co-directed the study.

These data revealed an association between frequent use and lower sperm concentration. The median sperm concentration was significantly higher in the group of men who did not use their phone more than once a week (56.5 million/mL) compared with men who used their phone more than 20 times a day (44.5 million/mL). This difference corresponds to a 21% decrease in sperm concentration for frequent users (>20 times/day) compared to rare users (<1 time/week).

Is 4G less harmful than 2G?

This inverse association was found to be more pronounced in the first study period (2005-2007) and gradually decreased with time (2008-2011 and 2012-2018). “This trend corresponds to the transition from 2G to 3G, and then from 3G to 4G, that has led to a reduction in the transmitting power of phones,” explains Martin Rösli, associate professor at Swiss TPH.

“Previous studies evaluating the relationship between the use of mobile phones and semen quality were performed on a relatively small number of individuals, rarely considering lifestyle information, and have been subject to selection bias as they were recruited in fertility clinics. This has led to inconclusive results,” explains Rita Rahban, senior researcher and teaching assistant in the Department of Genetic Medicine and Development in the Faculty of Medicine at the UNIGE and at the SCAHT, first author and co-leader of the study.

It doesn't matter where you put your phone

Data analysis also seems to show that the position of the phone - for example in a trouser pocket - was not associated with lower semen parameters. “However, the number of people in this cohort indicating that they did not carry their phone close to their body was too small to draw a really robust conclusion on this specific point,” adds Rita Rahban.

This study, like most epidemiologic studies investigating the effects of mobile phone use on semen quality, relied on self-reported data, which is a limitation. By doing so, the frequency of use reported by the individual was assumed to be an accurate estimate of exposure to electromagnetic radiation. To address this limitation, a study funded by the Federal Office for the Environment (FOEN) was launched in 2023. Its aim is to directly and accurately measure exposure to electromagnetic waves, as well as the types of use - calls, web navigation, sending messages - and to assess their impact on male

reproductive health and fertility potential. The data will be collected using an application that each future participant will download to their mobile phone. The research team is actively [recruiting](#) participants for this study.

The aim is also to better describe the mechanism of action behind these observations. “Do the microwaves emitted by mobile phones have a direct or indirect effect? Do they cause a significant increase in temperature in the testes? Do they affect the hormonal regulation of sperm production? This all remains to be discovered,” concludes Rita Rahban.

contact

Rita Rahban

Senior Researcher and Teaching Assistant
Department of Genetic Medicine and Development
Faculty of Medicine
SCAHT – Swiss Centre for Applied Human Toxicology
UNIGE
+41 22 379 55 57
Rita.Rahban@unige.ch

Serge Nef

Full Professor
Department of Genetic Medicine and Development
Faculty of Medicine
SCAHT – Swiss Centre for Applied Human Toxicology
UNIGE
+41 22 379 51 93
Serge.Nef@unige.ch

Martin Rösli

Professor of Environmental Epidemiology
Swiss Tropical and Public Health Institute
Associated Institute of the University of Basel
+41 61 284 83 83
martin.roosli@swisstph.ch

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UNIVERSITÉ DE GENÈVE **Communication Department**

24 rue du Général-Dufour
CH-1211 Geneva 4

Tel. +41 22 379 77 17

media@unige.ch
www.unige.ch